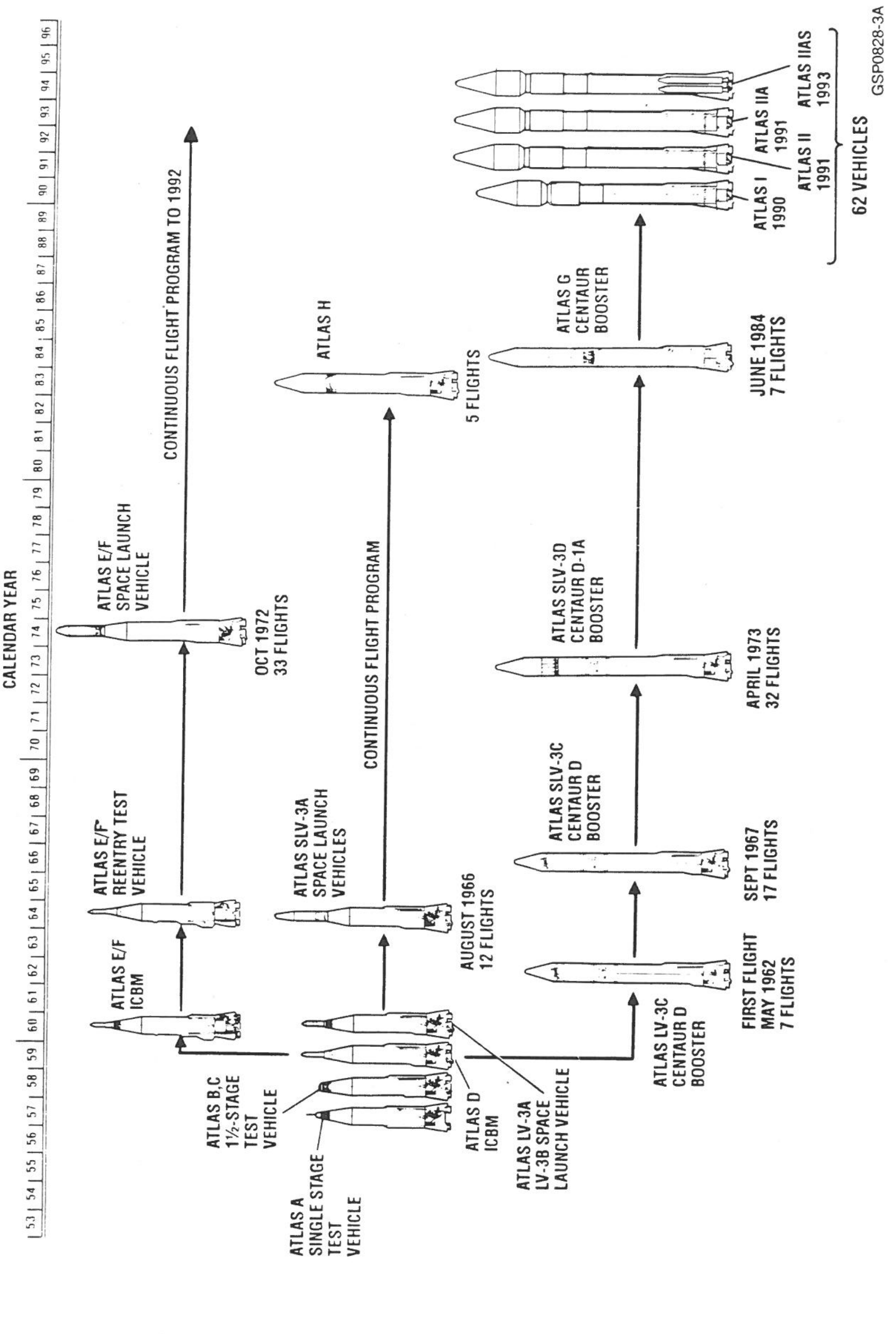

Figure 1-2. Atlas and Centaur have successively evolved to satisfy requirements of many missions.

1.4 EXPERIENCE IN LAUNCH SERVICES

Excluding ballistic missions, General Dynamics has conducted a total of 232 space launches. Our team is experienced in processing and launching all types of missions, ranging from low orbit to geostationary orbit to deep space probes. We have worked harmoniously and successfully with many agencies, customers, and spacecraft manufacturers in performing these services.

Our most recent launch was FLTSATCOM 8, successfully launched on 25 September 1989. Twelve additional missions are contracted for launch on Atlas before the first Telstar 4 launch date, and we expect that quantity to increase to 17. These launch services customers include Eutelsat, NASA, the Air Force, Hughes, and Intelsat.

1.5 LAUNCH VEHICLE EVOLUTION

This section describes the Atlas family of vehicles and their evolution from the last flown Atlas/Centaur. Included are discussions of the vehicle changes for each of these configurations. All of these design modifications are being verified with extensive analysis and comprehensive testing.

Atlas I, II, IIA, and Atlas IIAS are performance-enhanced variations of the Atlas G/Centaur D1-A, which successfully launched FLTSATCOM 8. The vehicle has undergone and continues to incorporate performance, cost, and reliability improvements to meet the changing needs of the marketplace. Vehicle enhancements and schedules are shown in Figures 1-7 and 1-8, and are described below.

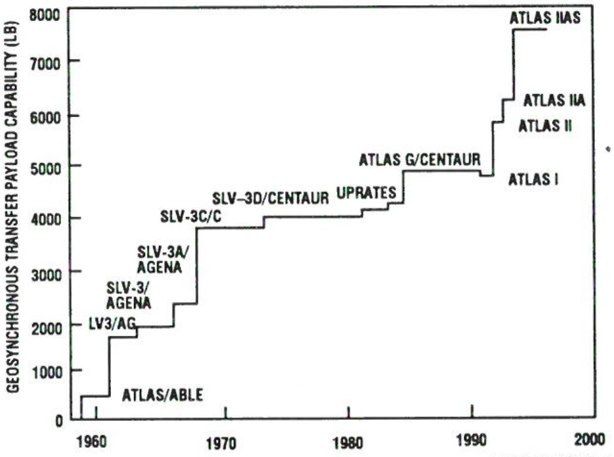

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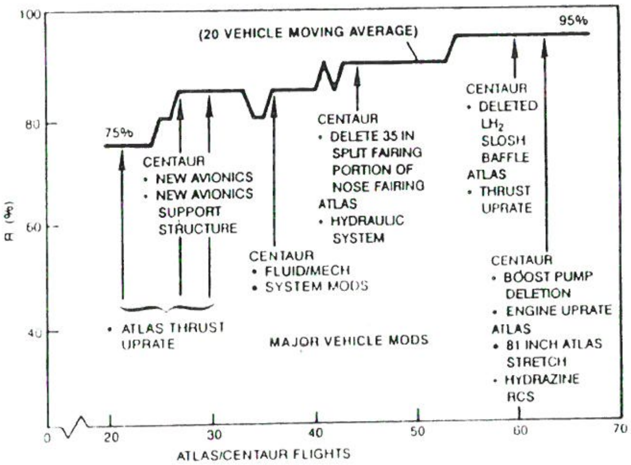
Figure 1-3. Atlas performance has demonstrated the ability to increase with spacecraft requirements.

1.5.1 ATLAS I — General Dynamics Corporation is funding the improvements on this commercial program, with substantial financial incentives for schedule and launch success, thereby minimizing



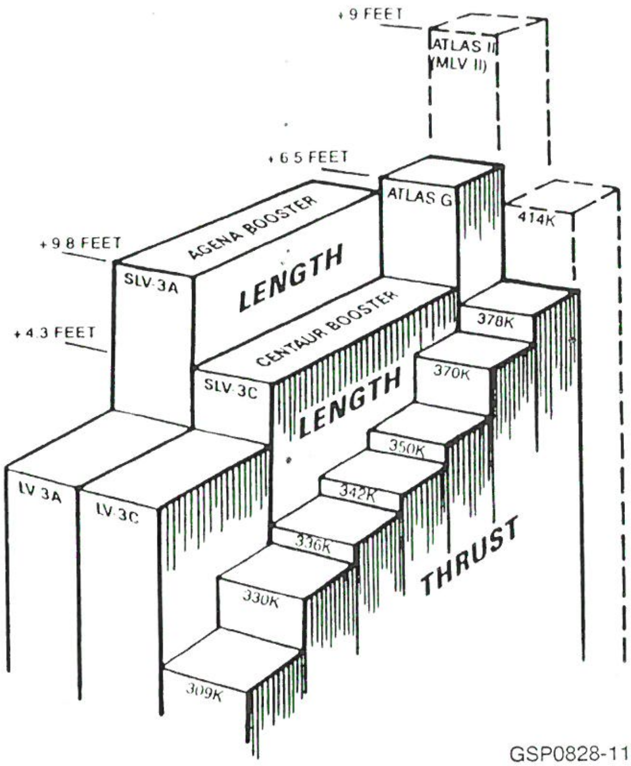


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Figure 1-4. Reliability continues to increase with evolutionary improvements.

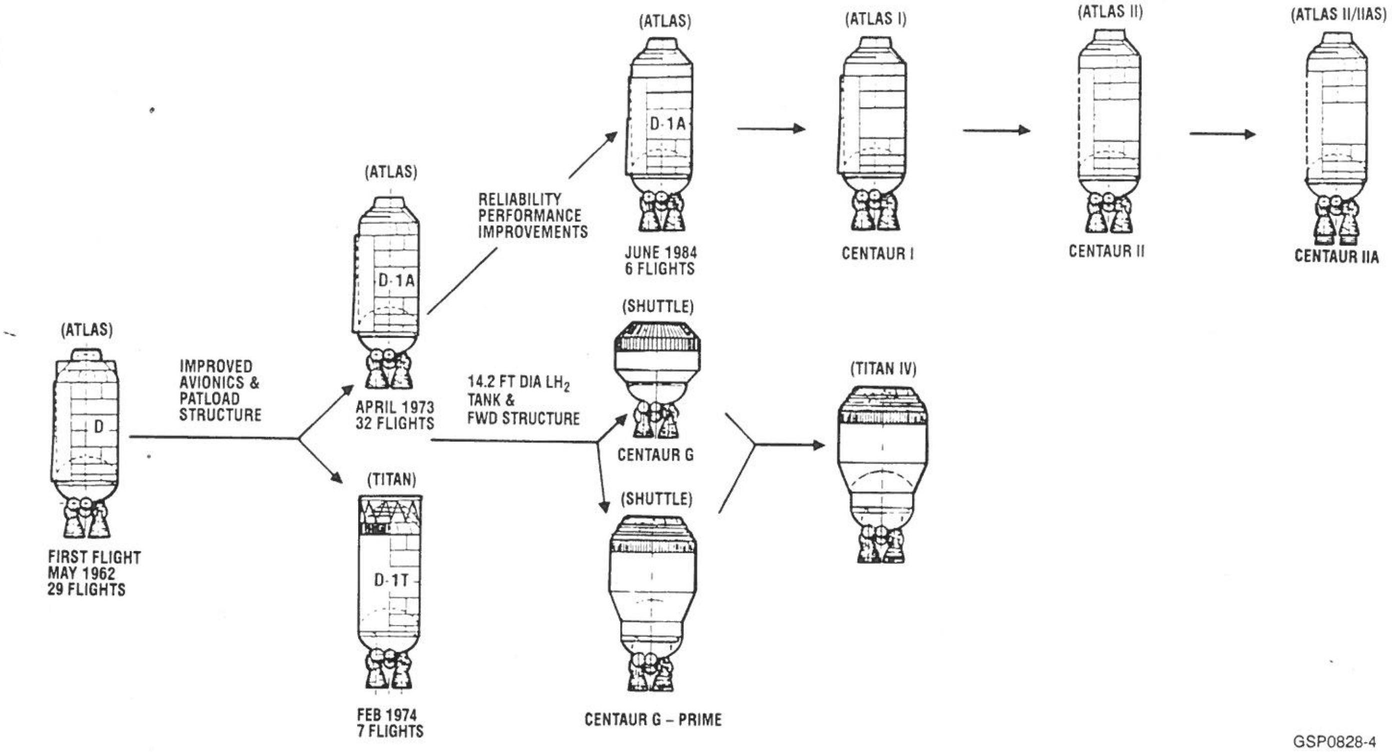

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Figure 1-5. Centaur evolution reflects changes to accommodate other boost vehicles as well as performance and reliability improvements.

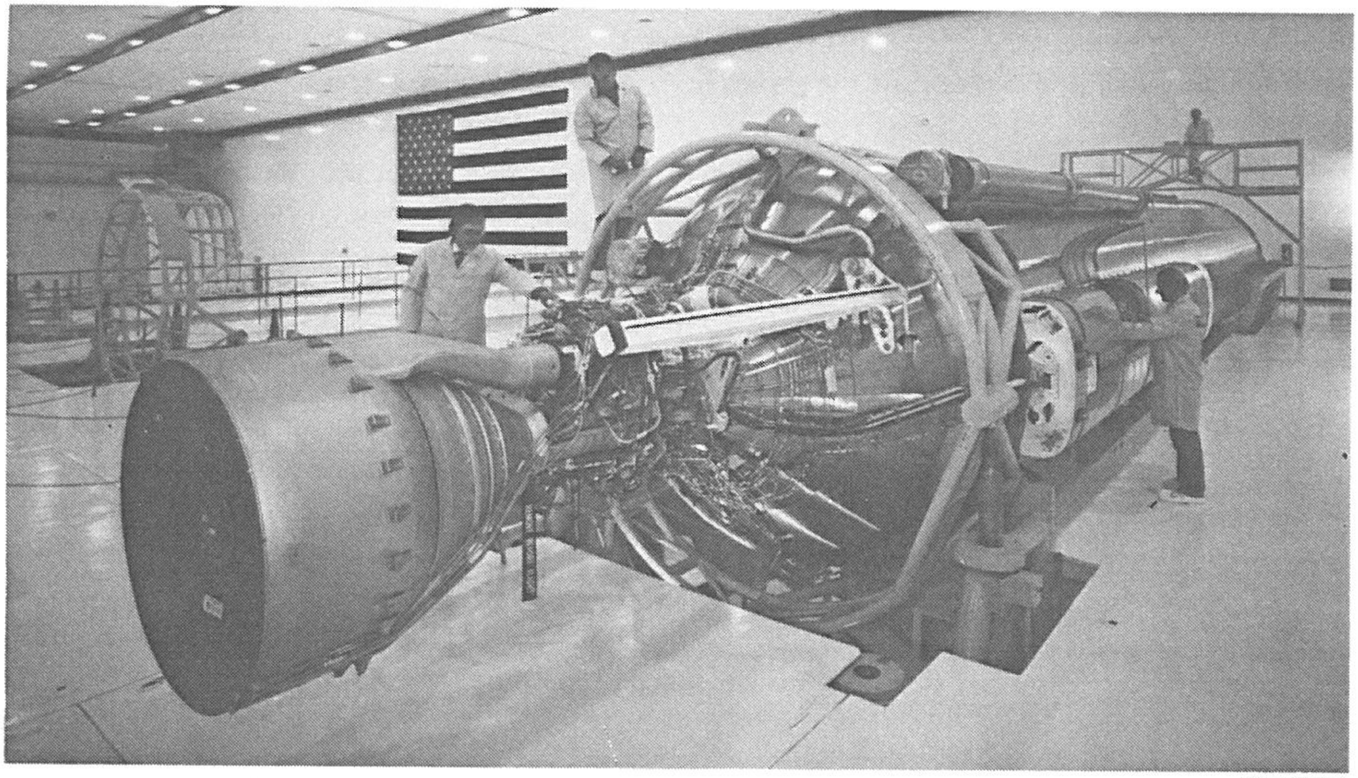

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Figure 1-6. Final assembly and checkout is performed at our Kearny Mesa Class 100,000 clean room facility.

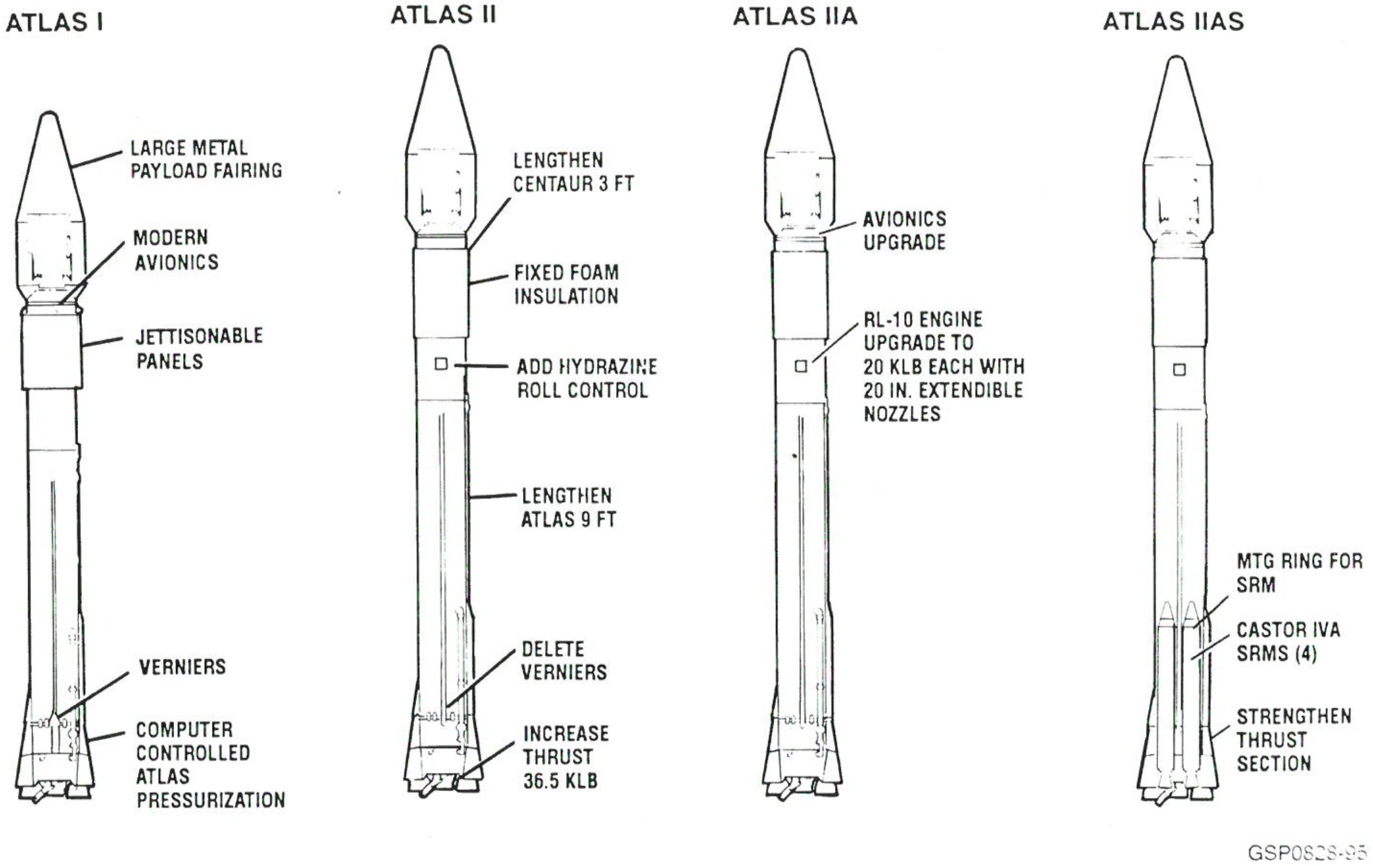

Figure 1-7. The Atlas family is evolving to meet and exceed the next generation of customer requirements.

the risk on spacecraft. The Atlas I is in production and will be flight-proven prior to the Atlas II vehicles.

The Atlas I adds a 14 ft payload fairing to the Atlas G/Centaur D1-A vehicle to increase the payload envelope for today's larger spacecraft. Because of the increased loads due to the larger frontal area of this fairing, the basic vehicle structure has been strengthened. In addition to the fairing, the design incorporates an additional rate gyro unit for vehicle control and a computer-controlled Atlas pressurization system (CCAPS) to reduce cost and replace obsolescent parts. The CCAPS system is based on the same technology as the highly successful Centaur computer-controlled vent and pressurization system (CCVAPS) currently being flown. Also incorporated into the Atlas I program are two standard payload adapters. These adapters and their separation systems are functionally identical to the Ariane 4 937B and 1194A adapter systems. Additionally, a Centaur Upgraded Avionics program is currently in development as discussed below. The Atlas I with improved avionics will have been flight-proven prior to the first Telstar 4 launch.

Centaur avionics system enhancements are the result of continuing efforts to improve our vehicle performance, reliability, and cost. They are characterized by the use of industry-wide standard components providing a wealth of maturity.

System enhancements affect three systems:

1. Guidance, Navigation, and Control
2. Telemetry
3. Flight Termination (Range Safety)

The core of the guidance, navigation, and control system, the Inertial Navigation Unit (INU) depends